EDMR Pilot Project

Final Report

August 2002

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Background

WPDES Permit Streamlining Project:

The Department, in an effort to improve program efficiency, developed an integrated database that will provide access to the monitoring, facility and inspection information, and permit-drafting systems using an Oracle based network. The basic framework and the permit drafting segment of the **S**ystem for **W**astewater, **A**pplications, **M**onitoring, and **P**ermits (SWAMP) was placed into production in December, 1998 followed by the monitoring segment in March of 1999. Development of new systems and enhancement of existing segments has continued. The time needed to draft a permit has been reduced from about 150 hours to between 60 to 70 hours and the permit backlog has been reduced to less than 10%.

While the permit backlog has been reduced and the permit drafting efficiency has improved, the time needed to enter monitoring information into our data systems has remained unchanged. Monitoring data is submitted on paper forms and is keyed by a contractor on to tapes and transported back to the Department to be loaded into the SWAMP database. The monitoring information is finally available in SWAMP about 4 to 6 weeks after being received by the Department.

It has always been a goal of the Department to develop a system to allow facilities to transfer data electronically. This goal is shared by many of the permitted or regulated facilities. Prior to the development of SWAMP, approximately 170 of the 1200 facilities generated DMRs onsite using various software packages. While the output looked similar to the original DMRs, many had errors that caused the databases to reject the information. This resulted in a situation where 14% of the forms generated 75% of the time needed to correct errors in the system. The number of facilities generating DMRs has increased in recent years.

In July of 1999, in preparation to beginning work on the EDMR project, the Department surveyed all of the facilities with specific permits. Approximately 64% of the surveys sent out were returned. Of the respondents, 70% had access to the Web and when asked about form submittal, 75% of the facilities responding chose the Web over paper.

The Department established the following goals regarding the electronic transfer of monitoring information.

Long Term Goals – EDMR Initiative

- Reduce reliance on paper forms.
- Reduce printing, mailing, and data entry costs.
- Perform quality control checks on submitted data before entry into SWAMP.
- Reduce staff time spent reviewing and routing submitted paper forms.
- Reduce the time delay between when the data is submitted and it is available to staff electronically.
- Provide electronic submittal of data in response to requests from permitted facilities.(Computer to DNR)
- Collect facts regarding data by sample result (LOD, LOQ, certified lab number)

Pilot Project

Funding:

The pilot was funded using a $150,000 federal grant from the Environmental Protection Agency. The grant period was from October 1, 2001 to September 30,2002.

Phased Approach:

Because of the limited funds available, the pilot phase focused on the development of the following goals:

Goals for the EDMR Pilot

- Complete the pilot by September 30, 2002.
- Complete the pilot within the $150,000 budget.
- Collect sample results, which are currently received on long and short form DMRs, electronically.
- Design and create a web page, through which the file is made available to the facility and the data is submitted to DNR.
- Develop security so that only a facility or DNR staff can view the file for a particular facility.
- Develop a signature process.
- Develop an authorization process to be used until WIMAP is fully functional.
- Conduct a test of the pilot process with 15 – 20 permitted facilities.
- Include a cross section of facilities in the pilot (type, size, computer expertise, and location).
- Work with the External EDMR Advisory group and an External Technical Advisory group (to be set up at a later date).
- Provide the capability to print the completed monitoring form at the facility.
- Incorporate elements needed by Legal and Environmental Enforcement to enforce permit violations.
- Create a product that doesn't require a high-end computer or purchase of additional software by facilities, which choose to file electronically.
- Incorporate the schema the EDMR XML Schema work group will be finalizing in October 2001.
- Collect feedback from the members of the Pilot to enhance the electronic data transfer system when it is implemented.

Structure of the Pilot System:

The pilot used a secure Web site linked to a test version of WIMAP, the password/user identification security system developed by the State of Wisconsin. The secure Web site and the WIMAP system was supplemented by a signed data verification sheet that contained a number that is unique to the data submitted by the permitted facility. This ensured the data transmitted to the Department is from an authorized agent of the permitted facility and that the data files cannot be intercepted or corrupted during transfer. The integrity of the data will be assured through the use of a checksum total. A checksum number is a mathematical total of key data points on the form designed in such a manner that any change in the data will impact the checksum total. The checksum total will be linked to the information when it is filed in SWAMP.

The EDMR process for the permitted facility was as follows:

- Register with WIMAP to obtain a password and user ID
- Submit a signed Trading Partner Agreement that identifies the following points of contacts for the roles and responsibilities of permit officials:
  - Authorized to Enter Data
  - Authorized to Submit and Certify Data
  - Authorized to Received Confirmation of Receipt of the EDMR
- Access the WDPES permits Web page

- Access the Electronic Report Page
- Enter password and user ID
- Select facility from menu
- Select report for the desired time period from the menu
- Enter data (data entered must be saved at the end of each session)
- Submit the report at the end of the reporting period (typically a month or quarter)
- Print the Certification Report with the checksum and document ID numbers
- Sign the Certification Report and send to central office of DNR
- Print the completed DNR from the Web for facility's files

The Department's responsibility in the EDMR process was as follows:

- Provide user training and support to the facilities that use the Web based system.
- Generate the EDMRs quarterly.
  (When the EDMR is implemented, the facilities with paper forms will receive printed copies and the forms for those who want to file electronically will be available on the Web)
- Match the checksum and document identification number on the certification form with the numbers in the data pending file.
- Transmit the information from the data pending file to the SWAMP database.
- Notify responsible permit official via email that the DMR had been filed electronically and accepted
- Within the confines of the budget, modify the EDMR Web page during the pilot based on comments received from the participants.

Coordination with State and Federal Efforts:

The EDMR system will be compatible with other systems nationwide. The Department has actively participated on national teams formed to evaluate systems of transferring data electronically. These teams have developed a national electronic schema that will allow systems to interact without the need to convert data. The EDMR system has been designed using this national schema.

The EDMR process was designed to satisfy the evidentiary requirements of the justice process. The Department's Bureau of Legal Services and the Wisconsin Department of Justice were active participants in the design of the EDMR system. The Environmental Protection Agency has proposed rules regulating the electronic transfer of data for regulatory purposes. The process and procedures designed into the EDMR system fulfills the legal requirements of the Clean Water Act and the proposed electronic data transfer rules to allow for full enforcement of State and Federal statutes.

The Wisconsin DNR has applied for and has received a grant to develop the infrastructure to participate in the National Environmental Information Exchange Network (NEIEN). NEIEN will provide for the transfer of environmental information between participating partners via nodes on the Internet. The use of the electronic schema and the XML format in the EDMR pilot will facilitate the transfer of information from the SWAMP database to the NEIEN node.

Teams:

The Internal Design Team managed the EDMR pilot with technical and network support from Phil Stark and Rob Verkest from the Network Service Section. The modifications made to the network by Phil and Rob were critical to the ultimate success of the pilot.

More than 55 permitted facilities volunteered to participate in the EDMR pilot. The Department used the following criteria to select the 23 facilities that were formally invited to participate.

- The selected facilities should be a evenly distributed across the state and between the five regions
- The selected facilities should represent a cross section of permitted facilities. Major/Minor, Industrial/Municipal, Surface/Land Disposal, Computer Literate/Novice

The members of the Internal Design Team and the selected facilities are summarized in Table A.

Volunteer Training/Support/Communication:

The facilities selected for the pilot were invited to participate in one of two pilot orientation sessions scheduled in October in Madison and Eau Claire. The EDMR team presented the project, demonstrated Web screens developed to date, and solicited feedback from the attendees. The Department established an email distribution list to communicate with the volunteers and to distribute periodic status reports and important program documents.

The volunteers were sent instructions on use of the EDMR Web site and most received side by side training and assistance from the basin staff in the Regions. The facilities were given the telephone number of the team leader who provided Help Desk technical support and consolidated the comments and concerns for the contract programmers.

Testing Phase of the EDMR Pilot:

The facilities began testing the EDMR Web pages in March of 2002 by entering the data submitted on their March DMRs. The comments submitted by the testers were used to modify the system for the second month of testing in April. The comments that could not be addressed due to the limited budget will be evaluated during the implementation phase of the project. The comments received and the action taken are summarized in Table C. The comments that will not be included in the implementation phase are included in Table D with reasons for the exclusion.

Customer Survey:

The customer satisfaction survey was sent to the participating facilities at the end of the pilot. A majority of the twelve facilities who returned their surveys, had positive comments about the pilot. Table E contains a summary of the comments.

Results of the EDMR Pilot

The goals and the results of the pilot as summarized in Table B. The pilot project successfully developed a Web based online data entry system that will serve as the basis for Phase 2 pilot that will address the machine to machine delivery of data. Listed below are some of the major accomplishments of the pilot project.

- First project to successfully use the WIMAP security system as it was designed.
- First Department project to work outside of the firewall
- First secured application in the Department to use the Internet for data entry.

Recommendations

1) The EDMR system should be fully implemented when funds are available.
2) The system will need to conform to current XML and electronic schema standards.
3) The Department should not offer the online EDMR to facilities outside of the pilot until the funds are available to fully implement the system.
4) The resources needed to train and support the users must be identified so ongoing program costs can be quantified.
5) The use of a signed and mailed paper certification sheet with signature and checksum number will need to be continued until state security and signature standards are approved.

Table A

Project Teams

Internal Design Team:

Gail Mills – Leader	Permits Process and Facility Management Section
Bob Weber – Team Sponsor	Permits Process and Facility Management Section
Kim Grittner	Programmer/Analysis
Mike Hammers	Wastewater Permits and Pretreatment Section
Keri Behm	Permits Process and Facility Management Section
Alice Miramontes	South Central Region
Jim Savinski	Northeast Region
Pete Prusak	Northern Region
Bonnie Kotila	Northern Region
Jack Saltes	South Central Region
Gerry Jarmuz	Southeast Region
Charlie Cameron	West Central Region
Tom Aten	Integrated Science Services
Ron Arneson	Integrated Science Services
Bob McHenry	Administrative Section
Stan Schneider	Bureau of Law Enforcement
Rick Prosise	Bureau of Legal Services
Barb Miller	Bureau of Enterprise Information, Applications and Technology

External Pilot Volunteers:

Blue Mounds
Burnett Dairy
Chetek
CityForest Corporation
Clear Lake
Coloma
Dickeyville
Green Bay Metropolitan Sewerage District
Hillshire Farm and Kahns
Maynard Steel Casting Company
Metallics
Mt Horeb
US Army Badger Army Ammunition Plant
Oshkosh
Park Falls
Silver Lake Sanitary District
Sparta
Sun Prairie
Town of Yorkville Sanitary District
Trent Tube Division Plants 2 & 3
Western Racine County Sanitary District
Dairyland Power Alma 6 Madgett

Table B

Goals for the EDMR Pilot

- Complete the pilot by September 30, 2002.
- Complete the pilot within the $150,000 budget.
- Collect sample results, which are currently received on long and short form DMRs, electronically.
- Design and create a web page, through which the file is made available to the facility and the data is submitted to DNR.
- Develop security so that only a facility or DNR staff can view the file for a particular facility.
- Develop a signature process.
- Develop an authorization process to be used until WIMAP is fully functional.
- Conduct a test of the pilot process with 15 – 20 permitted facilities.
- Include a cross section of facilities in the pilot (type, size, computer expertise, and location).
- Work with the External EDMR Advisory group and an External Technical Advisory group (to be set up at a later date).
- Provide the capability to print the completed monitoring form at the facility.
- Incorporate elements needed by Legal and Environmental Enforcement to enforce permit violations.
- Create a product that doesn't require a high-end computer or purchase of additional software by facilities, which choose to file electronically.
- Incorporate the schema the EDMR XML Schema workgroup is expected to finalize in October 2001.
- Collect feedback from the members of the Pilot to enhance the electronic data transfer system when it is implemented.

Long Term Goals – EDMR Initiative

- Reduce reliance on paper forms.
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- Collect facts regarding data by sample result (LOD, LOQ, certified lab number).

Table C

Status of Comments from Testers

Comments	Fix Needed?	Done	Full Implementation Phase
<, >, * are being lost when the short form is saved.	Yes	Yes	-
A "Log Off" button is needed on each screen.		Yes	-
Can't save a number in the times exceeded box when reporting the number of weekly average limit exceedances.	Yes	Yes	-
The Delete File button is too close to other function buttons. It could be used in error.		Yes	-
The order of the columns on the web form is different than the paper DMR when you first open the file. After you save, the order of columns is correct.	Yes	Yes	-
Time outs occur in a very short amount of time. You can be entering data and not know you have timed out until you save and receive a validation error.	Yes	Yes	-
When non-numeric or non-alpha characters are entered in a comment field, the file can not be opened again. An error message is displayed.		Yes	-
When the Delete File button is used, a verification question should be displayed. It could be used in error.		Yes	-
Would like a vertical line separating the display of the limit and number of times it was exceeded when viewing the form as the submitter/certifier.		Yes	-
Calculations should be performed including totals, averages, maximums, minimum, and limit exceedance counts.			Y
Can not edit the date of sample on the short form.	Yes		Y
Inconsistent problem with the down arrow not working the first time a blank page is brought up			Y
The keyboard arrow keys don't work properly on the short form.	Yes		Y
When you move to another page without saving and answer yes to the reminder pop-up, you end up at the same page after the save is performed. Can you move to the desired page once the save is completed.			Y
Currently the certification page is not saved, but can be recreated. Thus any comments regarding a violation exceedance are lost once the form is submitted. Would like the Certification sheet saved so typed comments aren't lost			Y
The save process takes quite a while.			Y
The vertical line separating the display of the limit and number of times it was exceeded should run through the cell so it isn't misinterpreted as a one.			Y
When save is performed the screen resets to its original position. Could the display remain the same as it was when the save button was used?			Y
When you save the certification statement, the Save button should disappear.			Y
The certification form does not request that the reason for violation exceedances be documented in the box provided.			Y

Comments	Fix Needed?	Done	Full Implementation Phase
Would like a cleaner printed version of the form when using the printing function.			Y
Would like a read only role so that a completed file could be reviewed by others, who didn't have access to enter, change, or delete the data or submit the form.			Y
Would like a row in which to enter totals. When averages are reported, totals must be calculated and would like to store them.			Y
Would like the Print button displayed before the form is completed and submitted.			Y
Would like machine to machine transfer capability of data from the existing plant operating systems to the file on the web page.			Y
Can the ability to add monitoring data not required by the permit be added? (ex., chlorine column displayed May - Oct, but began chlorine monitoring in April) *(Editors note: A new electronic monitoring blank form will be used to capture this information.*)			Y
The keyboard arrow keys move the cursor from cell to cell in the area for entering individual sample results. They don't work in the summary section. *(Editors note: At full implementation, the Web page will calculate the totals and summaries – The arrows will not be needed.)*			Y
Would like to use the enter key to move from cell to cell.			N
Can the fields capitalize when you tab to the next field on the log on screen?			N
Would like some method of saving passwords so they don't have to be keyed each time.			N
Would like the ability to change the order in which the columns are displayed.			N
Would like a method of saving completed files to a disk or hard drive.			N
Would like a "Save As" button so that the file can be saved outside of the Web page, worked on, and saved back.			N
Formatting in the laboratory comments box is lost when the submitter/certifier logs on.			N
Would like the ability to adjust column width.			N
Would like a process for entering the lab certification number for all columns without actually keying the number multiple times.			N
Would like the lab certification number be defaulted so that it only has to be changed when a lab other than the usual one is used.			N
Would like the number of times each limit is exceeded defaulted to zero so this field wouldn't need to be keyed unless there was a limit exceedance.			N

Table D

Comments not addressed in the Implementation Phase of EDMR

Would like to use the enter key to move from cell to cell.
This fix would violate the GUI (Graphic User Interface) design principles of programming.

Can the fields capitalize when you tab to the next field on the log on screen?
This fix would violate the GUI (Graphic User Interface) design principle of programming.

Would like some method of saving passwords so they don't have to be keyed each time.
This fix would corrupt the security process and would allow unauthorized users to access the EDMR files.

Would like the ability to change the order in which the columns are displayed.
We are unsure why this option is needed. The fix would be expensive that would not benefit a wide range of users. The system analyst will look at this again during the full implementation.

Would like a method of saving completed files to a disk or hard drive.
The data on the Web page is in an XML format and would be of little value if saved to a disk or hard drive. The individual EDMRs will be available on line and can be accessed in the future. The format of the printouts will be modified in the Implementation phase of the EDMR project to mirror the paper DMRs presently being used by the permitted facilities.

Would like a "Save As" button so that the file can be saved outside of the webpage, worked on, and saved back.
The data on the Web page is in an XML format and cannot be managed in this manner. The system allows the users to save a partially completed EDMR to be retrieved and complete in the future. This need may be addressed depending on the technology used to fully implement the system. The system analyst will investigate options.

Formatting in the laboratory comments box is lost when the submitter/certifier logs on
This issue may be resolved since the Implementation phase will use the PDF format. This will support the ability to format comments. The system analyst will investigate options in the future.

Would like the ability to adjust column width
The column widths are established by the database in XML format and cannot be modified by the user. The systems analyst will investigate in the future. This may be a low priority for the use of limited resources.

Would like a process for entering the lab certification number for all columns without actually keying in the number multiple times.
The system analyst will investigate the potential of modifying the EDMR page to allow the laboratory certification number to be entered once each month and the fields will be automatically populated when verified by the user.

Would like the lab certification number be defaulted so that it only has to be changed when a lab other than the usual one is used
The Department is concerned that the correct laboratory certification information will never be entered if a different laboratory is used for a specific test. The system analyst will investigate the potential of modifying the EDMR page to allow the laboratory certification number to be entered once each month and the fields will be automatically populated when verified by the user.

Would like the number of times each limit is exceeded defaulted to zero so this field wouldn't need to be keyed unless there was a limit exceedance.
The Department is concerned with the accuracy of this information if defaulted to zero. The EDMR process will be modified during the implementation phase of the project to allow the data to be evaluated online and provide immediate feedback to the permitted facilities. This modification will provide totals and averages. The system analyst will also evaluate the potential of modifying the Web page to identify violations of effluent limits and complete the number of times each limit is exceeded.

Table E
Results of the Customer Satisfaction Survey

Question	Yes	No	Comments
Did the EDMR Pilot meet your expectations?	8		• There are still a few improvements that can be made as far as the totaling of the columns and functionality of the arrow keys.
		4	• It was cumbersome to fill out with saving the data all the time. The spreadsheet needs to calculate totals and in my case, calculate two waste streams into one. Jim Savinski designed a lotus spreadsheet years ago that did everything I needed. • Would like to see more auto calculations. Some improvements could be made to make data entry easier. • I was prepared for the initial startup problems however, not as many as I encountered. • Because we are looking for machine to machine transfer capability.
Did you receive enough training/information prior to beginning the project?	11		• Jim Savinski went over how the system worked.
		1	• We were not able to open the web page during the training because of database problems. I was able to "self train" when available.
Did you find the written instruction helpful?	11		• Because of the side-by-side training, I didn't really need to refer to the written instructions.
		1	• I just followed Jim Savinski's Instructions.
Did the Department staff provide the support you needed to complete the pilot?	11		
		1	• I did not receive any response to messages left after our site crashed. The problem was fixed, but I was not aware of it until I went into the site again to "check".
What other instructions or support would you have found to be helpful?			• None – Process went well • Working with our basin engineer and Gail's office, I believe the instructions and support was adequate.
Did the basin engineer visit your facility to provide side-by-side training?	10		
		2	• Katie Teske did and she did a fine job. • By mutual agreement we decided that an on-site visit was not necessary. The written instructions and a little assistance over the phone during the initial run was all that was needed.

Do you feel that side-by-side training will be needed as the Web page is expanded to other facilities?	9		• Maybe some that were involved in the pilot could go to neighboring plants to help.
		2	• I don't think it is necessary unless a facility feels it is necessary. The written instructions and a little assistance over the phone during the initial run was all that was needed. • Depends on their computer experience.
Do you feel the level of security to access the Web was appropriate?	10		
		2	• These transmissions should be secure – According to the message received when logging on they are not. • The Web page as accessible to "any" person using th e computer, by simply using the "back" function. A "log out" function is needed.
What is your opinion of the two levels of security? (Data entry and submittal)			• Adequate from the security perspective. 1. We need to be able to "save" comments on the submittal page. 2. We used (6) submittal people to facilitate our review process. • These transmissions should be secure – According to the message received when logging on they are not. • I think it works well, however, there are some facilities that will use one person for both entry and submittal. The main purpose is to prevent data tampering and I think it will help. • Both were OK. • It seemed to work fine. I had no problems with it. • I like the fact that the submission information doesn't show up until you open the submittal page. However, it is redundant when the same person enters and submits the form. • Probably a good idea, especially for the person responsible for the data. • I think it lowers the possibility of submittal "accidents". It also adds another level of security that some facilities require. • It was fine. • Good.

What is your opinion of the look and/or functionality of the Web page during the second month of the project?			• Satisfactory. • Looks good, however it would help if the top and the bottom columns were permanently lined up. • Data entry is rapid and generally operated as designed. The split screen is handy and functioned well. I believe the form could be improved further if more boxes contained "XXX's" when the parameter does not apply to the facility's permit. I understand the final form corrections would take a lot of editing. In the long run, I believe it would help. • OK. • Could the look of the printed version be improved as well? Maybe something that more resembles the forms currently used. • I had some problems printing a copy of the report. • Functionality improved, some improvement needed on the arrow key functionality on the Summary Page. All-in-all, was much better. • The look was fine, but I lost two months worth of submitted data somehow. When opening the Web page periodically, I would notice that the data mysteriously disappeared. This warrants a need for hard copies, which pretty much defeats the purpose. • OK. • It would be nice to get all the arrow keys to function correctly and the summary area should total the lines automatically. This past month the second and third page of my EDMR I had to do twice because it did not save the first time. That is frustrating when you have to do it twice. • It was better. • Good.
The Department has received funding from a Federal grant to design the machine to machine transfer (computer to computer) component of the EDMR project. Would you be interested in participating in a pilot project to support this initiative?	9		• Please notify us regarding this pilot project. We are ready to participate. • I would be willing to participate in the machine to machine pilot, this is the way for our facility to go. We have a large amount of data to report. Re-keying data that is already within our database is very inefficient for us and also leads to data entry errors. I would like to say "Well done", I thought this went very well.
		2	• The purpose of this project is to save time and to improve effic. The EDMR needs to calculate totals, min and max values etc. so these won't have to be done by hand. In my case, I have to calculate two waste streams into one. If the EDMR can't do this, I will have to enter all my data in the lotus spreadsheet that Jim Savinski designed for me, then reenter everything on the EDMR.
			• Is this in house or from my computer to yours? If it is in house, it would not apply here because this is the only computer at the facility
Additional Comments			• I began filling out DMRs and the Air Emissions up date when they were both 3 copy forms. The emissions update was computerized gradually with the first step being the submittal of the floppy diskettes. This year, with no fanfare, the entire form was sent by DNR, and submitted by me over the Internet. Perhaps the electronic DMR program could benefit from this approach.